UNITED STATES OF AMERICA
NUCLEAR REGULATORY COMMISSION

BEFORE THE ATOMIC SAFETY AND LICENSING BOARD

In the Matter of CONSUMERS POWER COMPANY (Midland Plant, Units 1 and 2)	)	Docket Nos. 50-329 50-330

NRC STAFF TESTIMONY OF ARNOLD H. MELTZ ON THE FINANCIAL COSTS OF DELAY (EXCLUDING REPLACEMENT POWER)

Gilbert S. Keeley, the Project Manager for Consumers Power Company's Midland nuclear plant, filed an affidavit dated October 22, 1976 (Affidavit of Gilbert S. Keeley on Behalf of Consumers Power Company) in support of "Response of Consumers Power Company" to the October 13, 1976 letter of the Commission. A portion of this affidavit deals with the delay costs associated with suspending construction for five months and nine months. Attached as Exhibit 3 to this affidavit is a comparison of the current budget, broken down into major cost components, with those which would result from a construction suspension for the periods mentioned. According to the data shown in Exhibit 3, the current budget for the Midland nuclear plant is $1.67 billion and a nine-month suspension in construction will boost the total plant cost to $1.92 billion, an increase of $250 million. As shown, these figures do not include nuclear fuel costs. The purpose of this testimony is to provide an explanation of what the $250 million consists of, how it was arrived at, and how one might assess its magnitude.

Exhibit 3 indicates that about $120 million, or almost half of the projected increase, is attributable to the allowance for funds used during construction (AFUDC). According to the Federal Power Commission's Uniform System of Accounts, AFUDC includes "the net cost for the period of construction of borrowed funds used for construction purposes and a reasonable rate on other funds when so used." Therefore, AFUDC is equivalent to the cost of capital used over the period of construction: interest charges paid on debt, dividends paid on preferred stock, and a fair return on the common equity. Although these costs are properly includible in the electric plant accounts as a cost of construction, ratepayers normally do not provide revenues to cover these costs until the construction is complete and the plant goes into commercial operation. Since construction work-in-progress is not generally considered "used and useful in the public service," it is not allowed into the utility's rate base for rate setting purposes. This means that Consumers Power Company and most other electric utilities with large construction programs expend sizeable amounts of money on which they receive no cash return until the "used and useful" test is satisfied. Over the period of construction, the costs associated with construction activities, including AFUDC are capitalized on the books of the utility as part of construction work-in-progress. An off-setting credit is then made on the income statement under "Other Income." The dollar amount of AFUDC to be capitalized is computed by multiplying the weighted average

The staff has determined that when the Midland units come on-line in 1981 and 1982, they will have the lowest production costs of any unit, with the exception of Palisades Nuclear and hydro capacity, within the applicant's system. It is therefore of some economic concern to the applicant and its customers to have Midland available as scheduled. Clearly, if the Midland units are delayed, Consumers Power Company (CP) must seek out alternative power sources to make up power that would have been forthcoming from the Midland units. Since it is logical to assume that the least cost units will be used to the maximum, independent of whether Midland is on-line or not, all alternative power sources available to the applicant will be more costly and will require the utility to incur incremental costs. The cost differential between producing the energy with Midland vs. the alternative constitutes the actual cost of the replacement power.

The selection of an alternative power source is not something one can readily predict. Logically, the utility will utilize the least expensive alternative available. However, what is available will depend on the demands existing on the system in 1981 and 1982. Seasonal patterns, as well as diurnal patterns of demand will affect this choice. Also, flexibilities in the utilities planned outages and maintenance checks may well alter the final selection. Depending on these factors, replacement power may be supplied by some combination of base, intermediate, and peaking units on the system, or thru outside purchases, or the creation of additional capacity.

For the sole purpose of our analysis of the cost of replacement power we conservatively assume little or no growth on the CP system. Consequently, the cost estimates developed herein are modest as they assume that the applicant will be able to make up the energy deficiency internally thru the utilization of existing capacity. It is further assumed that either coal or oil fired units will be available to make up the energy differences.

The cost of replacement power refers to the cost differential during that period of time between the presently scheduled availability of the Midland units and the date of availability that would occur as a result of the proposed suspension, the relevant time period is 1981-1982.

In 1981 and 1982, the nuclear fuel cost is estimated at 6.9 and 7.4 mills/KWh in 1981 and 1982 dollars respectively. These estimates are based on information previously presented in testimony at the Wolf Creek hearing.[1] Here, it was assumed that the nuclear fuel cost would escalate at 8% thru 1982 and at 5% thereafter. In this testimony the staff utilized a number of sources of information in preparing its nuclear fuel cycle cost estimate. The estimate considers the various fuel cycle components as identified by ERDA. The first step was to evaluate 1974 estimates of AEC and update these costs based upon latest available information. The source of these updates was to contact ERDA experts most closely associated with the various fuel cycle components together with experts in the private sector, particularly regarding U_3O_8 price forecasts. The results of these efforts are reproduced below as Table.1.

In 1981 and 1982, the coal fuel cost is estimated at 12.4 and 13.0 mills/kWh respectively and for the same years the oil fuel cost is estimated at 28.0 and 29.4 mills/kWh. These values are also in 1981 and 1982 dollars.

These coal and oil estimates are derived from average prices paid for coal and oil for steam-electric plants in Michigan in 1975 as quoted in Table 13 of FPC News of March 19, 1976. The Staff has used a representative equivalent for 1 KWh of electricity of 10,000 BTU's of coal or oil. In addition, 1975 prices were escalated at 5% per annum (see Enclosure 1).
Thus, the average fuel differential between nuclear and coal is approximately 5.5 mills/kWh, and between nuclear and oil, it averages out at about 21.5 mills/kWh.

[1] Same as Source for Table 1.

These price differentials are then mulitplied by the number of kWh's of nuclear generated electricity foregone due to the delay. Assuming a 65% capacity factor, the Midland units would have been capable of generating 0.6 billion kWh per month. Thus, if the energy is made up with coal units, the cost of replacement power would approximate 3.3 million dollars per month. If oil is the alternative, the cost of replacement power would approximate 13.0 million dollars per month.

Table 2 shows the cost of replacement power per month under different capacity factor assumptions and under different alternative fuel assumptions.

TABLE 1

ESTIMATED NUCLEAR FUEL GENERATION COSTS
(1982 DOLLARS)

Cost Component	Mills/kWh
Mining and Milling (\$40/lb of U_3O_8)	2.33
Conversion to UF_6 (\$2.57/lb U)	0.12
Enrichment (\$128.50/kg SWU)	1.84
Fabrication (\$171/kg U)	0.66
Shipping and Reprocessing (\$249/kg U)	1.07
Pu Credit (\$26/g)	(0.66)
Waste Management	0.17
Subtotal	5.53
Carrying Charge (at 15%)	1.85
Total	7.38

Source: Supplemental Testimony of Darrel A. Nash before the Atomic Safety and Licensing Board, Wolf Creek Generation Station, Unit No. 1, March, 1976.

Enclosure 1

Justification for a 5% Per Annum Escalation Rate for the Price of Coal

Several steps were taken to arrive at a 5% escalation rate for projecting the price of coal. These steps included:

A. A review of the current literature on the subject matter. This included an examination of:
   (a) the National Energy Outlook-1976 prepared by the Federal Energy Administration,
   (b) A Study of Coal Prices prepared by the Executive Office of the President, Council on Wage and Price Stability, and
   (c) several other reports on fuel price projections prepared by, among others, Arthur D. Little, the Federal Power Commission, and the Environmental Protection Agency.

B. Collecting computerized pricing data on recent coal deliveries to every electric utility in the U.S. This data was obtained on a computer tape from the FPC.

C. Discussions with knowledgeable individuals in the field of fuel prices. This included discussions with representatives of FEA, FPC, Arthur D. Little, and Sobotka and Company.

In making this recommendation on projected coal prices, it is recognized that by simply escalating the 1975 price of coal, one ignores, to a degree many of the factors which might influence coal prices in the future. For example, there are several factors which would tend to lower the future price of coal. These factors include, among others, the availability of vast supplies of western coal and the relative ease of strip mining operations in the west. On the other hand, there are forces at work which could substantially increase the price of coal. These include the continuing labor difficulties and rising coal miner wages coupled with declining productivity. In addition, strip mine reclamation programs could add significant costs to the price of coal.

The staff's approach to projecting future coal prices would be based on the assumption that these factors would tend to cancel one another out and that the net effect would be that coal prices will increase at the nominal inflation rate of 5 percent per year.

Based on discussions with the parties identified in Item C above, the staff's approach to projecting coal prices may be conservative. FEA representatives stated that in their opinion, future prices of low-sulfur coal will escalate substantially over existing prices in real terms and that high-sulfur coal will probably escalate at the normal inflation rate. An FPC representative indicated that in real terms, coal prices can be expected to increase by 50 percent by the early to mid-1980's. When this 50 percent real increase is added to the 5 percent inflation rate assumed in the proposed treatment, this yields price increases ranging from 9.6 to 12.0 percent per year.

5% Escalation for the Price of Oil

With respect to oil, staff believes that a 5% escalation rate is very conservative given the continued long-term outlook for a shortfall in supply of this fuel.

TABLE 2

COST OF REPLACEMENT POWER PER MONTH

CAPACITY FACTORS	COST OF REPLACEMENT POWER PER MONTH (in millions of dollars)
Coal vs. Nuclear	
55%	2.8
65%	3.3
75%	3.8
Oil vs. Nuclear	
55%	11.0
65%	13.0
75%	15.0

PROFESSIONAL QUALIFICATIONS
SIDNEY E. FELD
U. S. NUCLEAR REGULATORY COMMISSION

I am Sidney Feld, Regional-Environmental Economist with the Cost-Benefit Analysis Branch, Division of Site Safety and Environmental Analysis of the Regulatory Staff of the Commission. I served with the Staff from July 1973 to August 1974, and rejoined the Staff in October 1975. I am responsible for reviewing and analyzing Applicants' environmental reports and preparing cost-benefit sections for the NRC Staff's Environmental Statements. During the 1973-74 period, I conducted generic research on topics related to the social and economic impacts of nuclear power plants, including costs of delay, and the potential for population and industrial growth in the vicinity of nuclear plants. More recently, I have been involved in preparing a staff guide for use in instructing staff reviewers on the requisite methodology in analyzing the issue of need for facility. I also presented testimony on need for power and conservation of energy issues for the hearings on Alvin W. Vogtle Nuclear Power Plant, April 1974, the Shearon Harris Nuclear Power Plant, May 1974, and the Wolf Creek Generating Station, February 1976.

I received a B.B.A. Degree in Economics from the City College of New York in 1967, an M.A. Degree in Economics from the University of Rhode Island in 1969, and a Ph.D. Degree in Resource Economics from the same university in 1973. My graduate degree in resource economics focused on the application of economic theory to public resources. Areas of study included: simulation of market economic solutions; consideration of social implications such as environmental impacts; and the application of decision tools such as cost-benefit analysis.

From September 1974 through August 1975, I was an Assistant Professor of Resource Economics at the University of New Hampshire at Durham, New Hampshire. In this capacity, I taught courses in Resource Economics and Statistics. I also served as co-investigator on a Sea Grant research project to examine economic activity in the New Hampshire Coastal Zone.

During fiscal year 1970, I served as the coordinator of the Governor of Rhode Island's Technical Committee on the Coastal Zone. In this capacity, I prepared working papers and parts of the Committee's Final Report. The Committee's recommendations were adopted by the State Legislature in 1971, leading to the establishment of a Coastal Zone Council and Coastal Zone Laboratory, both of which are presently the state's principal governmental bodies overseeing coastal resources.